TECHNICAL REVIEW AND EVALUATION OF TITLE V APPLICATION FOR
Alamo Lake Compressor Station

PERMITTEE: El Paso Natural Gas Company
AIR QUALITY PERMIT NO. 1000604
DATE: 8/21/97

TECHNICAL REVIEW OF PERMIT NUMBER 1000604
(El Paso Natural Gas Company, Alamo Lake Compressor Station)

General Comments

El Paso Natural Gas Company (EPNG) provides natural gas transportation services for natural gas suppliers and end users throughout the southwestern United States. EPNG owns and operates a large pipeline network for which the Alamo Lake Compressor Station serves as one of the gas compression locations. Compression is needed to maintain enough pressure in the pipeline to keep the gas flowing through the pipeline and is accomplished by one Solar Taurus turbine engine and one General Electric Frame 3 regenerative turbine engine. Because this facility has been automated, Alamo Lake is an unattended location.

The Alamo Lake station operates one Solar Taurus turbine engine and one General Electric Frame 3 regenerative turbine engine to drive the compressor units. The GE regenerative cycle gas turbine is fitted with a Dry Low NOx (DLN) combustor to minimize NOx emissions. The gas turbines are powered by the combustion of natural gas. The primary pollutant present in the stack gases resulting from combustion of natural gas is NOx. Formaldehyde, SO_2, CO, PM, and VOCs are other pollutants present in the stack gases. Other equipment on site is comprised mainly of valves, compressor seals, connections and associated piping, and emissions from these units are mainly trace amounts of VOCs.

Regulatory History

Permits:

Permit No. 75013

The first permit that EPNG obtained for operation of its facility at the Alamo Lake compressor station was the installation permit # 75013 in December, 1992. This permit allowed for the installation and operation of the Solar Taurus turbine engine. The most relevant conditions of this permit are:

1. EPNG shall install and operate the Solar Taurus turbine engine in compliance with A.A.C. R18-2-801.1 (40 CFR 60, Subpart A) and A.A.C. R18-2-801.36 (40 CFR 60, Subpart GG).
2. On and after date of start-up, EPNG shall not cause to be discharged into the atmosphere from the Solar Turbine stack, 0.019 percent by volume of NOx at 15 percent O_2 and on a dry basis and at conditions specified in 40 CFR 60, Subpart GG; and 0.015 percent by volume of sulfur dioxide at 15 percent O_2 and on a dry basis, or, 0.8 percent by weight sulfur content in natural gas fuel .

3. On and after date of start-up, EPNG shall not cause to be discharged into the atmosphere from the Solar Taurus turbine any gases which exhibit greater than 20 percent opacity.

4. During construction activities and thereafter, dust emissions from open areas shall not exhibit opacity greater than 40 percent. Water shall be used during construction phase and throughout the operation of compressor station to assure compliance.

5. The total emissions of air contaminants from any of the sources shall not exceed the values stated on Attachment "C" entitled "Emission Sources - maximum allowable emission rates." (This was based on 8760 hours of operation i.e. the source's potential to emit. This is no longer required in an operating permit and hence is removed.)

6. Performance test on the Solar Taurus turbine shall be conducted for NOx and SO2 within 60 days after achieving maximum operation potential or within 180 days of start-up. Performance test shall be conducted on at least a triennial basis.

7. Permittee shall burn only natural gas as fuel in the turbine.

8. Permittee shall measure the total amount of natural gas consumed and document daily fuel use.

9. Sulfur and nitrogen content in fuel shall not exceed 0.8% and 0.015% respectively. Amount of fuel burned, sulfur content and nitrogen content shall be recorded.

Exemptions from the Installation Permit No. 75013

Prior to the implementation of the new air quality program which is based on the 1990 Clear Air Act Amendments, ADEQ issued permits based on their old program. These permits contained conditions beyond an applicable requirement. Often, permits issued were not based on any applicable rules or laws and were mostly arbitrary. Now that Arizona has been implementing the new program, which has more defined regulations and limitations that can be included in the permit, every effort has been made to carefully check those permit conditions which have no basis for inclusion in a permit.

Further, detailed conformity checks between the old program and the new program revealed no basis for the 20% opacity limit for natural gas turbines in the installation permit. Nor is the opacity required by the State Implementation Plan (SIP), or any state or federal requirements. The limit was not used to avoid triggering an applicable requirement, such as Prevention of Significant Deterioration (PSD). Nor was it based on any modeling results designated to protect the National Air Ambient Air Quality Standards in Section 110(a)(2)(C) of the Clean Air Act. New Source Performance Standards, 40 CFR 60, Subpart GG, under the purview of which the Solar Taurus falls, does not by itself have any opacity limit for affected facilities. Neither an examination of the technical support document for the installation permit nor a discussion with the permit engineer offered any explanation for the inclusion of the opacity limit in the permit. The Title V permitting process has afforded ADEQ the opportunity to correctly apply the applicable limitations to permits which were incorrectly applied in the past, for which this is an example. ADEQ therefore has not included the condition in the Title V permit and is hereby revising the installation permit through the Part 70 renewal process and removing the opacity requirement.

It is well known that natural gas combustion results in minimal emissions and that the emissions standards are protected by an ample margin of safety. Imposing a rigorous monitoring and recordkeeping schedule would place unnecessary burden on the source. It was therefore decided to exclude the requirement to measure amount of natural gas consumed and record daily fuel use from the installation permit. Further, the Federal Energy Regulatory Commission's (FERC) Tariff agreement presented itself as a feasible alternative to the "daily" monitoring and

recordkeeping requirements of AAC R18-2-719.J. As stated in the technical review document, the Tariff agreement limits the sulfur content of the natural gas to 0.017 percent by weight of sulfur (an order of magnitude lesser than the standard). The Permittee cannot utilize natural gas that has a sulfur content greater than the aforementioned limit without violating the Tariff agreement. Specifying the monitoring requirement in this manner streamlines the permit conditions. This requirement in Section II.A.1 provides a method for continuous monitoring for particulate, opacity, and sulfur dioxide emission standards (Sections I.A.1, I.A.2 and I.A.4 of Attachment B). ADEQ therefore has not included the condition in the Title V permit and is hereby revising the installation permit through the Part 70 renewal process and removing the opacity requirement.

Permit No. 1000296

EPNG applied for a significant revision for the installation of a General Electric Frame 3 regenerative turbine engine fitted with a DLN combustor. This change reclassified the Alamo Lake station from a Class II source to a Class I source subject to Title V operating permit requirements. Addition of this GE Frame 3 turbine engine was determined neither to be a modification nor a reconstruction. Hence, this GE turbine manufactured in 1974 (Pre-1977) was not subject to NSPS requirements. Perusal of permit file for significant revision # 1000296 is suggested for further details. This significant revision was issued in January, 1997. Some of the relevant conditions of this permit are:

1. Permittee shall operate the GE Frame 3, Model 3142 RJ in accordance with R18-2-702 (General Provisions) and R18-2-719 (Standards of Performance for Existing Stationary Rotating Machinery).
2. On and after the date of startup, EPNG shall not cause to be discharged into the atmosphere from the stack, any gases which exhibit greater than 40 percent opacity.
3. On and after the date of startup, EPNG shall not cause to be discharged into the atmosphere from the stack, particulates in excess of emission limit in A.A.C. R18-2-719.C.1.
4. Opacity from non-point sources shall not be greater than 40 percent.
5. Permittee shall burn only natural gas as fuel in the GE turbine.
6. Performance test on the GE turbine shall be conducted for NOx and CO within 60 days after achieving maximum operation potential or within 180 days of start-up. Performance test shall be conducted on at least a triennial basis.
7. Permittee shall operate a DLN combustor in the GE engine for the reduction of NOx.

Testing:

Since its installation in 1993, the Solar Taurus turbine at the Alamo Lake has been tested in 1994 and 1996. The source has been in compliance as indicated by the results of these performance tests. The latest test performed on 3/4/96 yielded the following results:

Date	NOx	CO
3/4/96	20.1 #/hr	0.3 #/hr

Emissions

The potential emissions reported in the Title V permit application are as follows:

NOX: 164.2 tpy
CO: 105.1 tpy
VOC: 6.2 tpy
SO_2: 0.3 tpy
Formaldehyde: 6.9 tpy

These emission rates were based on emission factors (e.g. AP-42), theoretical stoichiometric considerations and 8760 hours of operation per year. The measured hourly emission rates (from the performance test in 1994) when multiplied with the actual hours of operation in 1994 give the following actual emissions for that year:

NOX: 40.4 tpy (test data, actual hours, Solar Taurus only)
CO: 0.3 tpy (test data, actual hours, Solar Taurus only)
VOC: 3.4 tpy (emission factors, actual hours, Solar Taurus only)
SO_2: 0.2 tpy (emission factors, actual hours, Solar Taurus only)
Formaldehyde: 3.8 tpy (emission factors, actual hours, Solar Taurus only)

The emissions inventory (EI) for the year 1994 (Solar Taurus only), submitted to the Arizona Department of Environmental Quality (ADEQ) reported the following emissions:

Pollutant	Actual Emissions in 1994
CO	9.82 tpy
NOx	35.8 tpy
SO2	0.05 tpy
VOC	0.25 tpy

Permit Contents : Attachment B

The Solar Taurus T6500 turbine engine was manufactured in 1991 and installed in 1993. This is subject to the provisions of New Source Performance Standards (NSPS). (A NSPS for gas turbines was promulgated on 9/10/1979 and is listed as Subpart GG of 40CFR60. This contains NOx and sulfur dioxide standards).

The GE Frame 3 gas turbine was manufactured in 1974 as a simple cycle turbine and as such was not subject to the provisions of any of the new source performance standards (NSPS). It was fitted with a DLN combustor when it was converted to a regenerative cycle. The significant revision to install this GE Frame 3 turbine was issued in January, 1997. The source indicated the date of anticipated start-up of this turbine to be 18 April, 1997. The DLN combustor reduced NOx emissions from the regenerative turbine engine and hence it was determined not to be a modification. Since the cost of buying a GE Frame 3 regenerative turbine with DLN combustor was 5 times higher than the cost associated with upgrading the existing GE Frame 3 turbine, it was determined that it was not a reconstruction. The change rendered the NSPS requirements inapplicable. Therefore, the GE regenerative turbine

is covered by the state rule; *R18-2-719: Standards of performance for existing stationary rotating machinery*. This state rule considers emissions of three pollutants (I) particulate matter, (ii) visible emissions, and (iii) sulfur dioxide. There is no reference to NOx or CO emissions.

Emission Limits/Standards

A. *Solar Taurus T-6500 Turbine Engine*

Because the Solar Taurus turbine engine is subject to the provisions of 40 CFR 60, Subpart A and GG (NSPS), the pollutants that are controlled are SO_2 and NOx.

SO_2: The emission limit for SO_2 requires EPNG to burn only pipeline quality natural gas that has a sulfur content of less than 0.8%.

NOx: The maximum emission limit for NOx is:

$$STD = 0.0150 \frac{(14.4)}{Y} + F$$

where: Y= heat rate (Please see 60.332(a)(2) for a more
F = NOx emission allowance complete explanation of Y and F)

in accordance with 60.332(c), due to the heat input of the turbine falling between 10 and 100 million Btu/hr (6500 hp = 57.2 MM Btu/hr).

The value of "Y" for the Solar Turbine T-6500 engine can be calculated from data supplied by EPNG in the Title V permit application for the Alamo Lake compressor station, page 8, where the maximum heat input is listed as 57.2 MMBtu/hr, at a peak load of 6500 hp. Using these numbers, the NSPS NO_X limit can be calculated as follows (assume no fuel-bound nitrogen, per EPA Guideline document EMTIC GD009, dated March 12, 1990):

(57.2 MMBtu/hr)/(6500 hp) = 8800 Btu/hp-hr

(8800 Btu/hp-hr)(1 hp/745.7 W)(1054.2 J/1 Btu)(1 KJ/1000 J) = 12.44 KJ/W-hr

STD = (14.4/12.44)(0.015) = 0.0174 = 174 ppmvd at 15% O_2

The NOx limit of 0.019 percent by volume in the installation permit was obtained by a direct substitution of the derated heat rate into the equation given in 60.332.a(2). With the information provided in the current application, ADEQ has calculated the NOx limit to be 0.017 percent by volume. Since this limit was more stringent than that in the installation permit, ADEQ decided to retain the language of NSPS in the permit.

B. *GE Regenerative Gas Turbine*

Natural gas combustion results in negligible particulate matter emissions. The maximum potential particulate emission from the GE gas turbine at the Alamo Lake station was calculated to be 6.81 tpy. The emission standard in R18-2-719.C imposes a particulate matter emissions limit of 163.4 tpy.

The operating permit requires EPNG to combust only natural gas for turbine operations. The sulfur standard in R18-2-719.F refers to low sulfur fuel *oils*, therefore this standard is not applicable to natural gas combustion. R18-2-719.I and R18-2-719.J require recordkeeping and reporting requirements of fuel sulfur quantity. These requirements support the aforementioned sulfur standard, and as such are not applicable to natural gas combustion. The visible emissions standard, R18-2-719.E, imposes a 40% opacity limitation.

C. *Non-point sources*

The standards in Article 6 are applicable requirements for non-point sources. The following sources will be monitored:

1. Driveways, parking areas, vacant lots
2. Unused open areas
3. Open areas (Used, altered, repaired, etc.)
4. Construction of roadways
5. Material transportation
6. Material handling
7. Storage piles
8. Stacking and reclaiming machinery at storage piles

All of these areas must comply with the opacity limitation of 40%. The control measures for these sites include gravel for driveways(1) and native vegetation for unused open areas(2). Most of the other sources require control measures of dust suppressants and/or wetting agents(3-8). Material transportation and storage piles also include covering the material (5 and 7), while stacking and reclaiming includes minimizing fall distance (8).

EPNG has indicated in the application, that rare instances of open burning may occur. The condition in the permit directs EPNG to obtain a permit from ADEQ, or the local officer in charge of issuing burn permits.

D. *Other Periodic Activities*

Abrasive Blasting

EPNG has indicated in the permit application that there might be a few occasions on which abrasive blasting activities are conducted on-site. R18-2-726 and R18-2-702 (B) are applicable requirements, and as such have to be included in the permit.

Spray Painting

EPNG has indicated in the permit application that there might be a few occasions on which spray painting activities are conducted on-site. R18-2-727 and R18-2-702(B) are applicable requirements, and as such, have to be included in the permit. R18-2-727(A) and R18-2-727(B) are included in the approved State Implementation Plan (SIP). R18-2-727(C) and R18-2-727(D) are also a part of the approved SIP. They are present in the definitions section of the SIP as R9-3-101.117. EPA approved SIP provision R9-3-527.C is not present in the amended rule. However, R9-3-527.C is an applicable requirement, and is federally enforceable till the current State SIP is approved by the EPA.

Mobile Sources

EPNG has indicated in the permit application that there might be a few occasions on which "mobile source" activities are conducted. "Mobile sources" refer to those sources covered by Article 8. R18-2-801, R18-2-802, and R18-2-804 are applicable requirements, and as such, have to be included in the permit. Portable sources as defined in A.A.C. R18-2-101.84 are not mobile sources.

Monitoring and Recordkeeping Requirements

A. *Solar Taurus Turbine*

SO_2: "Pipeline-quality" natural gas has to conform to standards approved by the Federal Energy Regulatory Commission (FERC). One of the FERC standards limits the sulfur content in the gas to less than 5 grains/100 scf (which is equivalent to 0.017 weight percent of sulfur). Another standard specifies that the heating value be greater than or equal to 967 Btu per cubic foot. EPNG runs the gas turbines with fuel drawn from their pipeline, and therefore it was decided that maintaining a copy of the FERC approved Tariff agreement on-site would be an adequate means of complying with the monitoring requirements for the sulfur standards.

Nox:

40 CFR 60.334(b) requires the Permittee of any stationary gas turbine to monitor nitrogen content of the fuel being fired in the turbine. However, the requirement to monitor the fuel nitrogen content has been waived as per EPA Memorandum *Authority for Approval of Custom Fuel Monitoring Schedules Under NSPS Subpart GG*, August 14, 1987. This memo was made available to our Division by Steve Frey of EPA Region IX. One of the items in the memo states:

> "Monitoring of fuel nitrogen content shall not be required while natural gas is the only fuel fired in the gas turbine."

B. *GE Regenerative Gas Turbine*

As noted in the preceding discussion under emission limits and standards above, natural gas combustion results in minimal particulate matter emissions. It was therefore decided that even though an emissions standard exists for particulate matter, it would be unnecessary and impractical to have a rigorous monitoring schedule for the particulate standard. For similar reasons, it was decided that a monitoring schedule for opacity would not be required.

"Pipeline-quality" natural gas has to conform to standards approved by the Federal Energy Regulatory Commission (FERC). One of the FERC standards limits the sulfur content in the gas to less than 5 grains/100 scf (which is equivalent to 0.017 weight percent of sulfur). Another standard specifies that the heating value be greater than or equal to 967 Btu per cubic foot. EPNG runs the gas turbines with fuel drawn from their pipeline, and therefore it was decided that maintaining a copy of the FERC approved Tariff agreement on-site would be an adequate means of complying with the monitoring requirements for the particulate, opacity and fuel use standards.

The permit requires the permittee to report the dates of operation of the turbine on each date semi-annually, during the six months prior to the date of report.

C. *Non-point Sources*

The specific non-point sources are listed in the above section. Monitoring and recordkeeping requirements for driveways (1) includes maintaining the gravel, and keeping a log of dates new gravel is added. Unused open areas (2) includes a monthly status of the areas and dates fresh vegetation was added. All other non-point sources (3-8) require a record of the date and type of activity performed, and the type of controls used. Also, monitoring requirements for the applicable open burning rule may be satisfied by keeping all open burn permits on file.

D. *Other Periodic Activities*

Other applicable rules are abrasive blasting, spray painting and "mobile source" activities. It was decided to prescribe minimal monitoring requirements.

Reporting Requirements

The permit requires the permittee to report any change in the FERC approved tariff agreement relating to the sulfur content and the lower heating value of the fuel. The permittee is also required to submit, along with the semi-annual compliance certifications, the dates of operation of each gas turbine, during the six months prior to the date of the report.

Testing Requirements

A. *Solar Taurus Turbine*

According to 40 CFR 60.335, a Method 20 test shall be conducted at 30, 50, 75 and 100 percent of peak load or at four points in the normal operating range of the gas turbine. A schedule of compliance was added to the testing requirement section which was satisfactory to both EPA and EPNG. This schedule requires EPNG to perform an initial performance test within one year of permit issuance. Provisions for obtaining an alternative testing protocol are also included in this section. Thereafter, EPNG is required to conduct an annual performance test for Nox prior to the anniversary date. The permittee is also required to conduct performance test once for CO on this unit along with the first performance test for NOx.

B. *GE Regenerative Turbine*

The source has been required to conduct or cause to be conducted performance test on its GE Frame 3 gas turbine engine for nitrogen oxides and carbon monoxide once. The permittee has been required to conduct this performance test on this turbine within 6 months before the permit expiration if the turbine is operated for more than 15 cumulative days during the course of the permit. The testing is required for the purpose of PSD review.

Air Pollution Control

The GE turbine is fitted with a dry low NOx combustion (DLN) system to reduce NOx emissions. The permittee has been required to operate and maintain this DLN system at all times. The source has been required to operate the GE turbine maintaining good combustion practice at all times to meet the emission limits stated in the permit.

List of Special Provisions

In their application, EPNG provided a list of special provisions that they wanted to be addressed in the permit. This list is located in Tab 1 of the application. They have been addressed in the following manner:
Maintenance and Inspection (Item 1), Emergency Shut Down Systems (Item 3), Cathodic Protection System (Item 4), General Maintenance & Construction Activities (Item 6), Start-up, Shutdown & Maintenance (Item 8), Insignificant Activities (Item 9), Portable Sources (Item 12)

It was decided that each of these items qualified for classification as an insignificant activity, and as such was included in the list in Attachment "E".

Hazardous Air Pollutants (Item 2): Refer to Sections VI and X, Attachment "A".

Abrasive Blasting (Item 5): Abrasive blasting activities have an applicable requirement in the Arizona Administrative Code AAC). Also, according to the definition in AAC R18-2-101.54, for an activity to be classified as insignificant, it should not have *any* applicable requirement. All projects have to comply with the requirements of R18-2-726 and R18-2-702(B). Refer to Attachment B, I.C.1 and II.C.1.

Spray Painting (Item 7): A similar argument as in Item 5 above provides the reason for including R18-2-726 as an applicable requirement. Refer to I.C.2 and II.C.2.

Emissions Trading (Item 10): ADEQ has determined that EPNG should apply for a permit revision (if necessary) in case there are any changes in the permitted equipment.

Location of records (Item 11): Refer Section II.B, Attachment “B”.

Air Conditioners (Item 13): Refer to Section XXI, Attachment "A".

Asbestos (Item 14): Refer to Attachment “C”.

Performance Tests (Item 15): Refer to Section VI, Attachment "B".